Montana
State
Library

This cover sheet created by Internet Archive for formatting.

MAR 2 6 1962

Montana State Library

3 0864 1004 4275 8

MONTANA *Industrial Horizons*

STATE PLANNING BOARD FEBRUARY, 1962

RESEARCH ACTIVITY ON MONTANA CAMPUSES

It is estimated (in INDUSTRIAL RESEARCH MAGAZINE for January, 1962) that more money will be spent by the nation this year to find new knowledge than the education industry will spend to distribute the old.

As improvement of the individual's economy and well being is a desirable end result of most human effort, thus research of all types is contributory to economic development of a state or nation.

Organized research and development is already active in Montana and is carried on principally by institutions of higher learning, governmental agencies, private business organizations, and private nonprofit research institutions.

On this and following pages is presented a brief description of some of the research completed or in progress at Montana State College, Montana State University, and Montana School of Mines. Topics were selected at random from information supplied by these institutions and represent only a portion of their total program since lack of space required much deletion and editing.

Several of these projects present an interesting investment potential to someone seeking such an opportunity.

MONT. STATE UNIVERSITY

Research and other creative contributions in the natural sciences, social sciences, humanities, fine arts, and professions are an important part of a university professor's professional activity and represent a vital kind of contribution to the state and nation, as well as to the advancement of knowledge.

In recent years there has been rapid development of research activity in industry and government, as well as in education, and this growth has been strongly evidenced at Montana State University. Currently 78 research projects are underway which are supported by separately-budgeted funds. In addition, some 175 different projects are being conducted by professors without financial support—projects as varied as developing new methods of casting concrete sculptural forms or writing a novel to studying blood parasites in sharp-tailed grouse.

The following are brief descriptions of a number of current or recently completed research activities at the University.

Sociology

A study of small businessmen in Montana, sponsored by the Small Business Administration, got under way in 1960 and was completed in 1961. The study's primary objective was to analyze factors contributing to success and failure in small business. A carefully selected

(Continued on page 2)

SCHOOL OF MINES

At Montana School of Mines, Butte, research includes all systematic studies for the development of new knowledge in geology, mining, mineral dressing, metallurgy, petroleum production and its translation to useful purpose.

A non-profit Research and Development Foundation has been established by the Mines alumni association to promote and administer sponsored research. All sponsored research accepted must strengthen and extend the education opportunities, further the development of the Montana School of Mines, and render service of value to the mineral industries. The foundation administers research in two categories; namely, cooperative projects and grants, and institutional projects.

(Continued on page 5)

Gov. Tim Babcock, having taken office after the tragic death of his friend and predecessor, Gov. Donald G. Nutter, has pledged his support of an aggressive and ambitious program to expand economic development in Montana.

We are confident Gov. Babcock will continue the necessary leadership initiated by Gov. Nutter for the betterment of Montana and the welfare of her people.

MONTANA STATE COLLEGE

Much of the research being carried on at Montana State College is directed toward the development of processes which will attract new industries to Montana or contribute to the expansion of industries already here.

Agricultural production is the biggest single industry in the State of Montana. Cash receipts from farm marketings over the last few years have averaged $400 million per year. In considering future industrial development in the state, agriculturally-related industries as well as agricultural production represent an excellent potential. Fifteen research and service departments and laboratories at the college and 7 branch stations are now engaged in agricultural research.

Through the engineering departments and the Engineering Experiment Station, technical investigations are made which will tend to increase the economy, efficiency, and safety of the manufacturing, mineral, transportation, and other engineering and industrial enterprises of the state and to promote the conservation and utilization of its resources.

Botany and Bacteriology

In the Botany and Bacteriology Department a study is being conducted of the effects of temperature, light, and rel-

(Continued on page 3)

MSU Research Program

(Continued from page 1)

sample of small businessmen were interviewed intensively. They were chosen throughout Montana to represent the various types of small businesses ordinarily found in the state. They served as the basic source of data on the aforementioned factors.

A first report of the findings has been made available by the MSU Bureau of Business and Economic Research. When finally published it is hoped that the report will assist Montana's small businessmen in the management of their enterprises, and their role as leading citizens of their communities and state.

Geology Dept.

Members of the geology faculty are on the alert for metallic (and non-metallic) mineral resources that could foster an increase in growth of established mineral industries, or provide new mineral industries in the State of Montana.

To this end, staff members have recently completed a restudy of the Indian Creek gold discovery near Townsend, Montana, and the Clinton mining district near Clinton, Montana. In progress is a selected study of the Couer d'Alene mining region of northern Idaho. It is hoped that new information may indicate extension of the eastern end of this great mining area into western Montana.

Also completed is a preliminary survey of the commercial berylium potential of selected areas in central and western Montana. Of recent interest is the possibility of certain newly discovered rock bodies in the Bitterroot Mountains of western Montana becoming a local source of aluminum ore for the northwest aluminum industry. Finally, by theoretical and experimental investigations into the nature of ore depositing fluids, the faculty hopes to better understand the mineralizing process and use the information to help uncover the great mineral wealth that still remains below the earth's surface.

A long-term effort to further man's knowledge of the biological and geological history of western Montana during the last 60 million years is also in progress. Data for this investigation are the sedimentary rocks and fossilized organisms present in the intermontane basins of the region. Collecting of fossils and geological mapping of the Jefferson River Valley, the area of initial investigation, is essentially complete. Forthcoming work will extend the study into the Beaverhead and other basins. This work will add significantly to the understanding of the evolution and ecology of now extinct animals, and the geographical and geological evolution of North America.

Dept. of Political Science

"Urban Planning in Montana" reviews planning activities conducted by municipal agencies in Montana during recent years, and is a part of the larger Urban Research Program of the Upper Midwest Economic Study. Particular attention is directed to the development of Master Plans in the larger Montana cities, and to experience with zoning and subdivision controls. Some comparisons of local experience will be attempted; and Montana studies in rapid-growth cities such as Billings, Great Falls, and Missoula are to be integrated into studies of comparable communities and their problems throughout the Ninth Federal Reserve District.

Business Administration

A current project in the School of Business Administration involves a study of employment in eleven western Montana counties for selected years, 1950-60. The study is designed to make available a more detailed picture of employment trends by counties and by industry. The data will be quite helpful to agencies interested in employment trends because at present there is a distinct lack of detailed information in this area. A major part of the data collection is completed, but formal analysis is yet to be carried out.

Forestry

A study of the Montana forest products industry is being made by the School of Forestry. The objective of this study is to provide a comprehensive understanding and a thorough analysis of the forest products industry—its relation to the forest resource on the one hand and to the economy on the other—in order to develop a factual basis for the encouragement of the type of industry which will make the best use of the resource and produce the greatest long run benefits to Montana and the region.

The industry turns on far more than the local resources and people. Its market area is the nation, particularly the Midwest and East; its main competition lies in the Southeast, the West Coast, and the provinces of western Canada; its major sources of capital are in the Midwest and on the West Coast; its equipment and supplies and at least part of its labor force and management come from outside the area. Much of the timber used by the industry is publicly owned, and the development of these timber areas for availability of supply is conditioned by the investment policies of federal and state agencies.

Information is being obtained through interviews of people in the industry and related fields such as credit, and from available data published and other materials. The owners and operators of most of the large industries in the State have now been interviewed; additional interviews are being held as time allows. Compilation of data is now underway with the aid of a graduate student. Final field work will be completed by early summer and the final report is scheduled for late 1962.

Results of the study should be of value to people in industry who are planning to expand or change their operations as well as to people concerned with the effects of public policy on the industry and on the forest resource.

Ingvard Eide photo

Parasitology research laboratory in the new Health-Sciences building on MSU Campus. Research includes a bighorn sheep disease study under a National Science Foundation grant and, under a Public Health Service grant, investigation of the hatching of a roundworm parasite of sheep and deer.

Logging Problems

Technological advances in road construction and logging methods have made previously inaccessible timber stands economically operable. Montana contains the largest stands of virgin timber in the continental United States, but complications in logging arise from the small tree sizes as compared to the coastal region, and slower growth rates when compared to the southern and coastal regions.

Faculty of the School of Forestry are working on a number of projects designed to help overcome these problems.

Three of the Forestry School staff are writing a handbook to demonstrate the application of a number of advances to the timberlands of Montana. This project is being financed by the largest single forest landowner in the state, the U. S. Forest Service.

Because logging activities are closely allied to markets and production facilities, economic analysis is necessary in appraising any new programs. The Forestry School has completed one such project in the Thompson Falls area dealing with the establishment of a small log sawmill in that area and supporting forest production. Currently under consideration is a somewhat similar project for the Flathead Indian Reservation which also includes facets of forest land use other than logging. Time studies of logging operations are conducted to determine the most economical methods for various types of operations. As one example, time studies of shearing Douglas-Fir Christmas trees have been a valuable aid for planning Christmas tree harvests.

Radio-TV Studios

A study of the educational uses of television in Montana was conducted for the purpose of investigating the uses to

(Continued on page 6)

Engineering and Agriculture

Research at MSC

(Continued from page 1)

ative humidity on a cereal fungus. It causes appreciable losses in some sections from the root and crown rots that it causes in wheat, barley, and oats, and the shrinking of heads and kernels. Although the loss in a field may not be more than 10 to 20 per cent of the crop, this amounts to a relatively high proportion of the potential profit of the grower.

It has been known for some time that a plant exposed to spores of the fungus does not necessarily become infected; apparently the temperature, light, and relative humidity of the air must be just right for the fungus. If the critical levels of these three factors could be determined and the necessary knowledge of spores in the air obtained, the plant pathologists would be able to predict with a fair degree of accuracy the probable occurrence of epidemics of these diseases in the above-ground portions of the plants, as can now be done for potato blight and other diseases. This might allow preventive measures to be undertaken, either such as the spraying with copper compounds or some other means of killing **Helminthosporium** at the most critical point in its life cycle.

This investigation has uncovered another interesting bit of information. Some plants produce some material on their leaves that kills the fungus spore when it is in the act of germination. If enough of this can be accumulated to allow us to determine its chemical structure, and to make it in the laboratory, we might have a new, non-toxic, fungicide that would be both safe and effective to use on food grains.

Another project was undertaken to get some basic information on blackleg in cattle, a disease that is important to the stock growers of this state, and one about which we really know very little so far as the actual effect on the body is concerned. The vaccine that is used to protect cattle against blackleg reflects this lack of basic knowledge, for we do not know just how it should be made or what particular toxins produced by the bacterium it should be directed against. Consequently, it is not much surprise to anyone that blackleg vaccine fails every so often.

The present study was designed to determine (1) how **Clostridium chauvoei,** the bacterium that causes blackleg, establishes itself within the muscle of the cattle and (2) how it brings about death. The first point is of more than ordinary interest from the standpoint of the mechanisms involved, for the bacterium cannot grow, so far as we know, in the presence of the concentration of oxygen that probably is present in healthy muscle. We are investigating the factors necessary for the growth of this bacterium, particularly those that might be important in the animal body.

The second point, that of the means by which the animals are killed by the bacteria, is equally difficult to understand on the basis of our present knowledge. When the bacteria are grown in the laboratory, no toxic substances are produced; we suspect, though, that toxic materials are produced by the bacteria when they grow in the animal body and that death is due to the absorption of such toxins. This point we are looking into by (1) a detailed investigation of the changes, biochemical and otherwise, that precede death in these animals and (2) a search for toxic materials that may be produced in the body in cases of this disease. The incorporation of such toxins in blackleg vaccines would almost certainly raise their protective power many times.

Electronics Research Lab

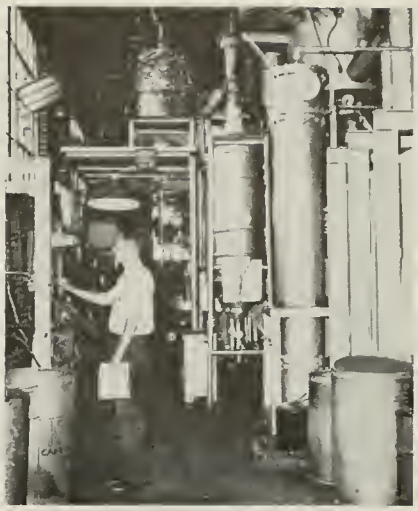
The Electronics Research Laboratory is the research organization of the Electrical Engineering Dept. of Montana State College. The laboratory operates under the Endowment & Research Foundation which is a separate, non-profit corporation yet a part of Montana State College. There are approximately forty employees, about one-third permanent staff and two-thirds graduate and undergraduate students. The research projects in the laboratory are supported by outside sponsors through the mechanism of research grants and cost reimbursement contracts.

At the present time, the largest project is an engineering study on the communication system used by the Minuteman weapons system. This work is supported by the Air Force through a subcontract from the Boeing Company. The study includes all aspects of the Minuteman intersite communication system.

For six years the laboratory has been active in meteor-burst communication systems. It is possible to communicate over the horizon in the VHF region of the radio spectrum using the reflection of radio signals from ionized meteor trails. The laboratory has designed and successfully operated a variety of specialized communication systems using this propagation mode. Sponsors for these projects have included Air Force Cambridge Research Center, Stanford Research Institute, Rome Air Development Center, Hughes Aircraft Co., and The Boeing Company.

For the last five years, the laboratory has had a program in the transmission of speech signals. This has been concerned with different types of speech processing and modulation systems leading to considerably increased reliability in speech communications. Many of the results of this project are directly applicable to single side band speech communications in the HF radio spectrum. The sponsors for these projects include Stanford Research Institute, Rome Air Development Center and Air Force Cambridge Research Center.

Much of the work at the laboratory has been in the handling and processing of digital information. This includes applications to communication systems and to electronic computers. A variety of modulation and detection systems have been studied and tried experimentally. Several projects on error correcting codes and the associated equipment have been successfully carried out. At present there is a project covering the storage of digital information in magnetic materials with an aim to increasing the density of stored information and improving the retrieval of the information. These projects have been sponsored by Rome Air Development Center, Air Force Cambridge Research Center and the IBM Corporation.



Pilot plant at MSC for making synthetic coke briquets.

The laboratory has had considerable experience in high precision frequency standards and related timing and frequency generation equipment. A variety of specialized frequency synthesizers have been develop for various communication and radar applications. Currently, there is a significant effort in the use of VLF radio propagation for frequency and timing purposes. Also, there has been a study on the use of meteor-burst propagation for precise time synchronism of remote locations. The laboratory along with its neighbor, Montronics, Inc., has entered into the development of communication and frequency instrumentation equipment. This has included the development of frequency synthesizer controlled HF communication equipment, a broad-band power amplifier for high frequency use, a general purpose single side band transceiver, an automatic tuning system for high frequency communication systems and a completely electronic tuned communication receiver.

At the present time, the laboratory is billing its sponsors at a rate of more than $30,000 per month. Much of this represents subcontracts and purchases from private business within the state. The State of Montana through its Engineering Experiment Station has supplied some of the research facilities for the laboratory. To give the laboratory greater flexibility in initiating new projects in promising areas, the Engineering Experiment Station also supplies a portion of the salary of three senior staff members

(Continued on page 4)

MSC RESEARCH

(Continued from page 3)

in the Electrical Engineering Dept. The current fiscal year is the first year in which the Engineering Experiment Station has supplied any operational support for research in Electrical Engineering. In previous years, these rather limited funds were used entirely for research facilities.

Also in the planning stage is a program to utilize Montana Indians in electronic assembly work. The majority of electronic assembly is generally done by women with men responsible for the product development, testing and sales of the products. This kind of industry is built around human skill as its principal asset and the focal point is usually the technical university of the locality—in this case, Montana State College at Bozeman. Out of the university come the ideas and trained manpower which give birth and growth to the industry.

Veterinary Research Lab

The current research program of the Montana Veterinary Research Laboratory includes beef cattle, sheep and horse problems of importance to the State of Montana.

Red water is an infectious disease of cattle of great importance to the cattle industry west of the Continental Divide. Ways are being studied to improve the currently available vaccine. Two forms of infectious abortion of sheep are being studied to find the means by which the causative microorganisms are carried over from season to season. The study of white muscle disease, also called nutritional muscular dystrophy, is being directed toward the discovery of the causative factor and the means by which a preventative chemical element, selenium, cures and prevents the disease.

A study of internal parasites of sheep and cattle is being conducted under two organized projects; the life history of the parasites and material and methods for treatment of parasites. Bacteriological studies on the microorganisms **Listeria** and a sheep foot rot bacteria are under investigation. The former affects man and a large group of domestic and wild animals, producing abortion and other losses. One study concerning all large animals is an improved method of gaseous anesthesia.

One serious disease condition, urinary calculi, kidney stones, or water belly, causes a loss among Montana steer calves estimated at $250,000 annually. The problem is to determine the cause and a method of prevention. The study is now a biochemical research problem.

Pulmonary emphysema, also known as cow asthma, is a disease of cattle and other mammals which affects the lungs and eventually the heart leading to death or permanent disability. The disease has become so prevalent in Montana and other intermountain states that it accounts for a large financial loss to cattlemen both through death losses at the onset of the disease and through the loss of reproductive ability and eventual irreversible illness that follows. **Not only is this a major problem in cattle, but is a serious major disease of humans. The work in this laboratory may have not only a direct application to the livestock industry but will add to the fund of knowledge contributing to research on the human disease problem.**

Chemistry

One of the chief reasons for the lack of a large scale hog industry in Montana is the absence of a local source of protein concentrate according to Dr. G. K. Goering of the MSC Dept. of Chemistry. A search has been made for a local source of protein and the developments reported from the laboratories of Montana State College indicate that mustard could fulfill this demand.

The mustard taste has been successfully eliminated from the meal by a process developed in the Department of Chemistry. The protein quality has been examined both chemically and by feeding experiments and found to be highly satisfactory. By proper selection of varieties the oil yields per acre would exceed that obtained from soybeans and the yield of protein would approach that obtained from soybeans.

At the present time there is no established market for mustard oil in the United States, but its composition indicates that it should compete with soybean oil and it is possible that for certain applications it might bring a premium over soybean oil. Processing problems have been rather thoroughly investigated through the cooperation of the United States Department of Agriculture Peoria laboratory with personnel of Montana State College.

All that remains is the problem of obtaining necessary capital for construction of the plant and development of markets for the oil. The department feels that this process has a greater potential for Montana than any others they examined.

Chemical Engineering

Montana's nonferrous metal smelters and elemental phosphorus plant consume several hundred tons of coke daily. All of this is imported since no coking operation is presently here. A process has been developed inthe Department of Chemical Engineering to make coke-like briquets from Montana's non-coking coal deposits. This project has progressed to the point where test orders are being filled for trial batches of 300 tons by American Smelting and Refining Company at East Helena and 500 tons by Victor Chemical Works at Silver Bow. Success of these tests should establish a market for Montana coal and make the production of synthetic coke briquets commercially attractive.

A process recently completed at MSC comprises carbonizing sawmill waste (sawdust and shavings) to charcoal, mixing it with a suitable binder and molding it into barbecue briquets. A small commercial plant using this process was established at Pablo, Montana.

The conversion of Butte and Philipsburg manganese ore into battery active manganese dioxide suitable for use in dry cells has been under development for some time. Current efforts are being devoted to producing sufficient quantity of material to enable one or more battery manufacturers to evaluate this product in their commercial operations. Success in this test should prove the economic attractiveness of this process.

The process of making sodium dichromate from Nye, Montana, chromite is being studied to attempt to increase the efficiency of the present commercial plant at Columbus.

An investigation is underway to develop a whiteware industry based on Montana ceramic raw materials. Currently, the combination of Lewistown clay, Gallatin Gateway feldspar, and Dillon flint shows promise. A figurine industry appears to be the best possibility in the near future.

The conversion of pulp mill waste liquor into paint solvents is being studied. This is currently in an early stage of development but there are indications that a portion of the waste liquor can be converted by treatment with a suitable catalyst into an acceptable paint solvent. This may turn out to be of interest to the Missoula pulp and paper mill.

Another project just getting underway is an attempt to convert the 30-million ton slag pile at Anaconda into an acceptable grade of iron ore. Reduction at elevated temperature and pressure is being studied but it is too early to predict the outcome. If successful, it would develop a market for what is now a useless waste product.

A method using azeotropic distillation to separate aromatic hydrocarbons—ingredients for plastics, paint solvents, pharmaceuticals, dyes, etc.,—from gasoline and petroleum naphtha is being studied. Gasoline from Montana's Elk Basin field is being used as the starting material. The object is to enable the local refiners to extract more valuable constituents from their petroleum distillates. So far, only a process to extract p-xylene has been developed but future study is planned to work out processes for higher boiling aromatic compounds.

Zoology-Entomology

Research activities in the Department of Zoology and Entomology are governed by a departmental policy to concentrate efforts in a particular field whenever possible because it is felt that a concentrated effort on a single problem is more apt to produce significant results than limited studies on a number of unrelated problems. Major research efforts at present are concentrated in the general field of grasshopper behavior.

There are some 98 species of grasshoppers in the state, each of which is different in most respects, and the presence of grasshoppers or their eggs in a given area is no indication of what the situation will be relative to numbers of these insects the following season.

As a result of findings to date, it is felt that the controlling factors of grasshopper population behavior lie within the animals themselves and not within the external environmental factors as has been popularly presupposed.

Ag Experiment Station

The state agricultural experiment stations throughout the United States, together with the Agricultural Research

(Continued on page 6)

School of Mines Research

(Continued from page 1)

Cooperative research offers organizations of an industrial or other character, as well as individuals, an opportunity for solution of problems requiring thorough investigation through careful application of fundamental knowledge. Basic questions and problems will receive careful study, but design, consulting work or routine testing are not acceptable. Research of cooperative character may be financed wholly by the cooperator or a part of the material requirements and services involved may be provided at the expense of the Research and Development Foundation.

The objectives of institutional research is to encourage personal research by faculty members and students. It is expected that interest will be directed toward certain fundamental aspects of the respective fields of either faculty members or students under faculty guidance.

To encourage and promote fundamental research, a Committee on Research has been established which assists members of the faculty and staff to obtain funds and opportunities to do research.

Geology

Geological investigations are in progress in the Gallatin Valley, West Fork Bitterroot River area, and Beaverhead County by the Geology Department. The department is also doing a differential thermal analysis of Montana clays, making motion picture studies of wave action, and investigating the application of three-dimensional color oblique photographs to geologic interpretation.

Metallurgy

Current activity in the Metallurgy Department is an investigation of the thermodynamic properties of the Fe-C-O solid system.

Recent research conducted by the department has covered the dekinking of copper whiskers, the production of pure alumina from clay by pyrosulfate infusion, and the pyrometallurgical processing of low grade titaniferous magnetic ores.

In the near future research into the thermodynamic activities of solid oxide systems will be initiated, as well as a study of the effect of strain rate upon the energy of formation of vacancies in platinum and a study of grain boundary diffusion in impure metals.

Mineral Dressing

The research activities of the Department of Mineral Dressing concern materials processing in application to the following: (1) the separation and concentration of metallic minerals from which metallic elements are subsequently derived; (2) the beneficiation of nonmetallic minerals for industrial purposes dependent upon their inherent mineralogic, physical, and chemical properties; and (3) the separation of discrete particles of whatever nature through differences in response to environmental conditions either inherent or induced.

Currently sponsored research concerns phosphate ores and beryllium ores. In the area of interpretive research, the electrical charge sign and charge magnitude of a typical Montana highway aggregate were determined. This research, accomplished in cooperation with the materials laboratory of the State Highway Commission, demonstrates that reactions occurring at the interface of an aggregate can be followed and evaluated by electrokinetic measurements. It is indicated by this research that significant information can be obtained regarding the interfacial bond between an aggregate and either an asphalt emulsion or a paving asphalt. Efforts are now being made to gain financial support for a research project to investigate the reactions between highway aggregates and asphalts.

Electrokinetics is the department's principal effort in basic research and deals with the electrical potential differences at the interface between two phases containing ions, multipoles, and electrons. An essential part of this research is the development of instrumentation and techniques. A related, beginning research project concerns the measurements of the change in electrical conductivities on the inversion of certain emulsions.

Petroleum

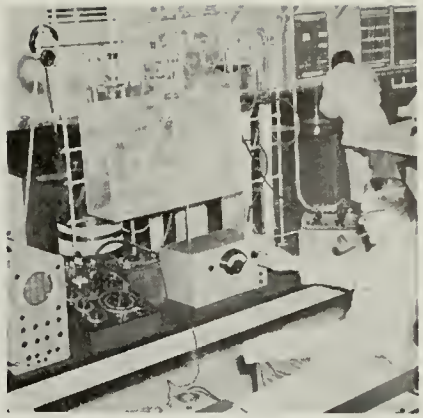
In the Petroleum Engineering Department research is underway concerning "The Study of Solution Gas Drive Performance in Stratified Reservoirs." This study is an analysis of performance data of known reservoirs having various permeability layers in the formation. Core analysis data and electric log data have been obtained from two major producing companies along with production histories.

This material will be analyzed statistically to investigate the quantitative relationship that may exist which would lead to a more reliable prediction of future performance of reservoirs when the variance of the permeability layers is known.

Mechanics and Electricity

Research regarding the feasibility of breaking rocks electrically is currently being conducted in the Mechanics and Electricity Department of the Montana School of Mines. The effects of high frequency electric energy applied to rock fragments of various rock types have proven that this method of secondary breaking is feasible. Efforts of research workers are being directed towards an understanding of the physical parameters involved. Methods of practical application are also being studied.

Successful development of this project will result in significant benefits to mining and construction industries of Montana. Reduction of working hazards and costs of secondary breaking are two of the important goals of this work. A more thorough understanding of the electrical and magnetic characteristics of rocks and materials will be reached.



Operating a streaming potential apparatus in the investigation of electrokinetic properties of materials, Department of Mineral Dressing at School of Mines.

Bureau of Mines and Geology

The primary function of the School of Mines is to educate engineers for the mineral industry. Through its department of the Montana Bureau of Mines and Geology set up by the legislature in 1919, it promotes the most effective utilization of the state's mineral resources. This is accomplished by investigations of the geology, production, treatment, and economics of the state's mineral resources, and by disseminating the knowledge gained by this continuous study.

The mineral industry is Montana's third largest source of income. However, mineral deposits are wasting assets, and the future of the industry depends upon new discoveries to replace those nearing exhaustion, and on the development of cheaper, safer and more efficient methods of recovery.

For the past five years the Bureau has conducted research on Montana clays and shales with respect to their chemical and mineralogical composition and possible economic worth. The project started in 1956 and will be continued until the readily accessible deposits are all sampled.

With the hope of contributing to the economic development of Lincoln, Flathead, and northern Lake Counties, the Bureau is conducting a survey of the possible location of mineral deposits of economic value and a study of the occurrence of industrial minerals and ores in Precambrian Belt strata. This 5-year project is being financed largely by the Pacific Power & Light Co. and the Great Northern Railway Co.

In cooperation with the Yellowstone-Big Horn Research Association, several structural investigations are being conducted in the Cooke City mining district, the Independence area in Park-Sweet Grass Counties, and in the Flint Creek Range.

Under a Small Business Administration research grant, a handbook is being compiled on record keeping for small business enterprises engaged in mining, and a study is being made on operating

(Continued on page 6)

MSC RESEARCH

(Continued from page 4)

Service of the U. S. Department of Agriculture, are charged with the responsibility of conducting a research program for agriculture. **The research program carried on by the Montana Station and its 7 branches located at Corvallis, Moccasin, Huntley, Havre, Miles City, Sidney, and Creston is broad and cannot be discussed in its entirety here. However, as an example of current research, the program concerned with barley serves to illustrate several research approaches to problems in agriculture.**

Because of the acreage restrictions placed on wheat, the acreage of barley in Montana has more than doubled in the last 10 years. The new feed grain program now proposes acreage restrictions on barley grown for feed but not for malting purposes. Since the characteristics of barley desired by the malting industry and that desired by livestock feeders are quite different, barley breeding research must recognize the needs of the two groups.

The goals for malting barley are to develop a superior variety that will grow under the environmental conditions existing in Montana and to determine management and cultural practices required to produce quality barley demanded by the trade. Station agronomists have determined that malting barley of satisfactory quality can be grown in Montana and Betzes barley has been accepted by the trade as a satisfactory malting variety. Annual premiums for malting barley grown in Montana average $500,000 to $600,000 per year. Income from premiums can be increased as increased production is encouraged in the future. One of the problems experienced soon after the first malting barley was grown in the State was that the market outlets were inadequate. This has led station economists to study the present market and seek possible improvements for the marketing of Montana malting barley. Producers, grain handlers and others in the state will benefit from the potential market improvements.

The goal for feed barley breeding is to improve the feeding quality which will increase the efficiency of gain for livestock fed this barley. To provide standards of quality, the animal nutritionists are feeding rats to determine if differences exist between varieties of barley and the rate and efficiency of gain. Station chemists have already indicated that differences do exist in the amino content of certain barleys and have also explained some of the deficiencies that exist when barley is fed as the sole source of feed.

Together with this phase of the barley evaluation work is the nutrition work being conducted on large animals, primarily with beef cattle. With our surplus of barley produced in Montana and with our large numbers of beef cattle, it seems logical that barley should be fed to beef cattle and that Montana should be exporting either fat cattle or beef carcasses rather than feeder calves and cattle. Research to date has indicated that there is real promise from a production standpoint in the use of barley as a major ingredient of fattening rations. The question must be answered as to whether or not Montana can compete with other cattle-feeding areas. Station economists are studying the competitive position of Montana relative to other areas. Their findings may assist feeders in making economic decisions in regard to expansion and operations. This research has not progressed to the point where results are available at this time.

In addition to barley being used for malting and as a feed grain, it has a potential for industrial utilization. For some time, station biochemists have been looking into the possibility of using barley as a source of raw material for the industrial production of such products as starch, syrup, alcohol, pectin, high protein feed supplements, and others. Much of this research looks encouraging and could well result in the establishment of processing plants within the State.

OLSON RESIGNS FROM SPB

Our Geologist, Ray B. Olson, has resigned to re-enter private business in Polson. We wish him much success as the new owner and manager of the Salish Hotel.

MSU PROGRAM

(Continued from page 2)

which television can be put in assisting the public schools and colleges in Montana in providing improved instruction. The Montana ETV committee secured financial assistance from the Ford Foundation to make the study possible. Montana State University is trustee of the funds. The report of the year's study is in the final stages of preparation.

Educational television is gaining wide acceptance as a means of direct and supplementary instruction. Through the use of TV, large numbers of students in widely scattered classrooms and schools can be reached with lectures, demonstrations and audio-visual materials. TV lessons can be recorded and stored for later re-playing. Remote rural schools can be reached with complete courses of materials for enriching existing courses. Urban schools can solve some of the problems connected with large enrollments with the aid of TV. ETV has been found effective in adult education and extension teaching as well as in in-service education.

The report of the project includes a plan for the development of a state-wide ETV network in Montana and makes recommendations regarding the implementation of the plan.

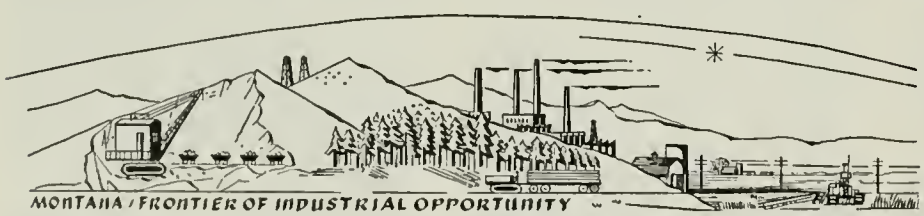
MSM RESEARCH

(Continued from page 5)

and marketing problems of small business enterprises engaged in lead and zinc mining.

To promote interest in Montana's mineral resources, a series of pamphlets is to be issued on mineral commodities that have a definite market potential. Phosphate rock will be the subject of the first report. Pamphlets on lime and limestone, iron ore, gold placers, silica, refractories, gypsum lightweight aggregate, sodium sulfate, graphite, and many other commodities are planned.

Publications have already been issued on the geologic occurrence of vermiculite, asbestos, pegmatite miners gypsum, talc, graphite, oil and gas, barite, iron ore, chromite, gold placers, lime, and limestone.



BULK RATE
U. S. Postage
PAID
Permit No. 83
Helena, Montana

Industrial Horizons

Monthly Newsletter—Vol. 7, No. 2—February, 1962

BUY MONTANA PRODUCTS — BUILD MONTANA JOBS

Reports on business concerns appearing in this publication do not constitute an endorsement of either the concern named or its products. Statements in this newsletter do not reflect Board policy unless official action is reported.

Montana State Planning Board
Sam W. Mitchell Building
Helena, Montana

State Library Extension Comm.
South Ave. & Middlesex
Missoula, Montana

Montana
State
Library

This cover sheet created by Internet Archive for formatting.